

Contamination Control System Via Vapor Hydrogen Peroxide Sterilization, Phase I

Completed Technology Project (2018 - 2019)



Project Introduction

NASA mission planners continue to develop plans for investigating celestial bodies including Europa, Enceladus, and Mars for potential life detection. Contamination Control and Planetary Protection requirements focus on both forward and backward contamination from such bodies where a number of acceptable processes have been developed for sterilizing spacecraft hardware and sample return materials. In particular for backward contamination control, NASA has shown that vaporized hydrogen peroxide is an effective method for sterilizing samples and surfaces. However, for long duration exploration missions, stored hydrogen peroxide solutions lose their efficacy. To ensure an effective vaporized hydrogen peroxide sterilization process for return trips, Skyhaven Systems LLC proposes to produce and optimize a novel reactor system that can produce 750 ppm vaporized hydrogen peroxide using only water and DC electrical energy. With this approach, surfaces and sample return materials can be effectively sterilized during sample collection using a NASA approved sterilant.

Anticipated Benefits

This vaporized hydrogen peroxide system is directed towards NASA's needs for contamination control and planetary protection. Integrating this peroxide generator into sterilization system will enable an effective sterilant to be produced for long duration missions where stored hydrogen peroxide is not feasible. Further, the oxygen and water breakdown products from the sterilization process can be reclaimed minimizing expendable losses.

Commercial opportunities for the hydrogen peroxide generator may be directed toward medical equipment sterilization. Integrating this generator into sterilizers will enable fresh hydrogen peroxide to be generated overcoming storage concerns that can lead to a loss of efficacy over time.



Contamination Control System
Via Vapor Hydrogen Peroxide
Sterilization, Phase I

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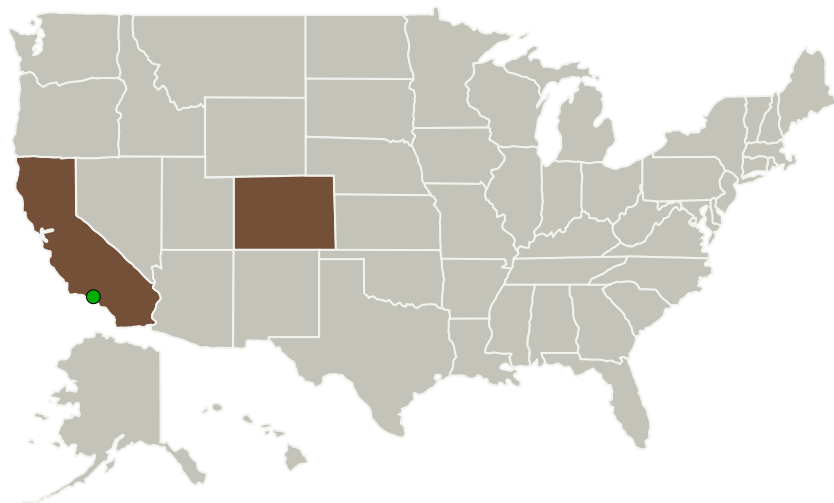
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Primary U.S. Work Locations and Key Partners



Organizations Performing Work	Role	Type	Location
Skyhaven Systems, LLC	Lead Organization	Industry	Steamboat Springs, Colorado
● Jet Propulsion Laboratory(JPL)	Supporting Organization	NASA Center	Pasadena, California

Primary U.S. Work Locations

California	Colorado
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Project Transitions

▶ **July 2018:** Project Start

✓ **February 2019:** Closed out

Closeout Documentation:

- Final Summary Chart(<https://techport.nasa.gov/file/140988>)

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Skyhaven Systems, LLC

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Principal Investigator:

Daniel Carr

Co-Investigator:

Daniel A Carr

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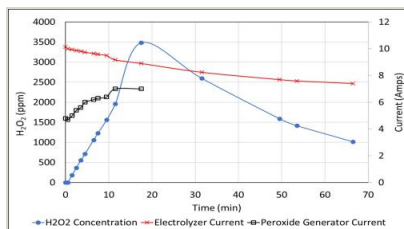


Images



Briefing Chart Image

Contamination Control System Via Vapor Hydrogen Peroxide Sterilization, Phase I
(<https://techport.nasa.gov/image/131867>)

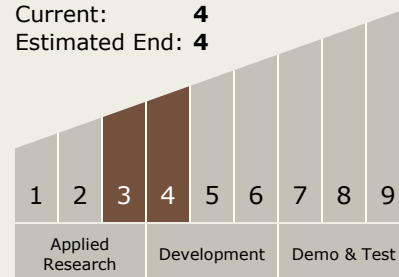


Final Summary Chart Image

Contamination Control System Via Vapor Hydrogen Peroxide Sterilization, Phase I
(<https://techport.nasa.gov/image/129706>)

Technology Maturity (TRL)

Start: **3**
Current: **4**
Estimated End: **4**



Technology Areas

Primary:

- TX07 Exploration Destination Systems
 - TX07.3 Mission Operations and Safety
 - TX07.3.5 Planetary Protection

Target Destinations

Mars, Others Inside the Solar System